WHAT IS CLAIMED IS:

1. A compact laser light generating system which substitutes the nonlinear effect of a solid or liquid material for diffraction gratings to amplify and compress high-energy laser pulses to produce high-energy shorter pulses.

2. The system according to claim 1, which has the following optics to produce high-energy shorter pulses:
1) optics capable of high-intensity axial pumping (end pumping) of solid laser light without fibers but by using a semiconductor laser light collimating system comprising the combination of cylindrical lenses and a prism assembly;
2) short-pulse pump laser light generating optics capable of stimulated Brillouin scattering (SBS) based compression and simultaneous correction of wave planes;
3) optics by which the pump laser light generated by said optics 2) is subjected to stimulated Raman scattering (SRS) based amplification and simultaneous shortening of pulse duration; and
4) optics by which the laser beams shortened in pulse duration by SRS are further shortened in wavelength and pulse duration by generation of harmonics.

3. The system according to claim 2, which uses two different cells or crystals to generate short pulses by SBS, so that unwanted amplification of Raman scattered light is prevented to ensure consistent production of short pulses (the tandem SBS cell method).

4. The system according to claim 1, which theoretically

differs from conventional lasers in that it depends on SRS for simultaneous amplification and compression of laser pulses without thermal absorption.

5. A laser light generating system for producing SRS while preventing channeling due to optical damage and self-focusing by using the half waist reflection method or the seed pulse supply method to realize significant decrease in the threshold value for stimulated Raman scattering (SRS), said system incorporating the following features in order to lower the threshold for SRS than in the case of generation from the conventional noisy light:

1) choosing a nonlinear crystal having such optical parameters that it has low threshold for the generation of Raman light, high threshold for optical damage and small tendency for self-focusing;

2) providing a reflector at the exit end of the crystal and at the half waist of a laser beam for facilitating the generation of Raman light (the half waist reflection method); and

3) using two crystals, one being used as an oscillator to stimulate scattered Raman light which is used as seed light and the other being used to amplify the seed light (the tandem crystal method).

6. The system according to claim 5, which combines at least two stages of Raman compression in order to shorten the pulse duration.

7. The system according to claim 5, in which the stimulated Raman scattering effect is realized in a

multiple of stages so that the pulse duration can be shortened in a multiple of stages without causing thermal distortion even if high average power is being output.

8. The system according to any one of claims 5 - 7, in which the produced short-pulse beams are further shortened in wavelength and pulse duration by generating harmonics.